

Orbital Debris Shape Characterization Project Abstract

Jessie Pease, NASA ODPO Summer Intern

I have been working on a project to further our understanding of orbital debris by helping create a new dataset previously too complex to be implemented in past orbital debris propagation models. I am doing this by creating documentation and 3D examples and illustrations of the shape categories. Earlier models assumed all orbital debris to be spherical aluminum fragments. My project will help expand our knowledge of shape populations to 6 categories: Straight Needle/Rod/Cylinder, Bent Needle/Rod/Cylinder, Flat Plate, Bent Plate, Nugget/Parallelepiped/Spheroid, and Flexible. The last category, Flexible, is still up for discussion and may be modified. These categories will be used to characterize fragments in the DebrisSat experiment.

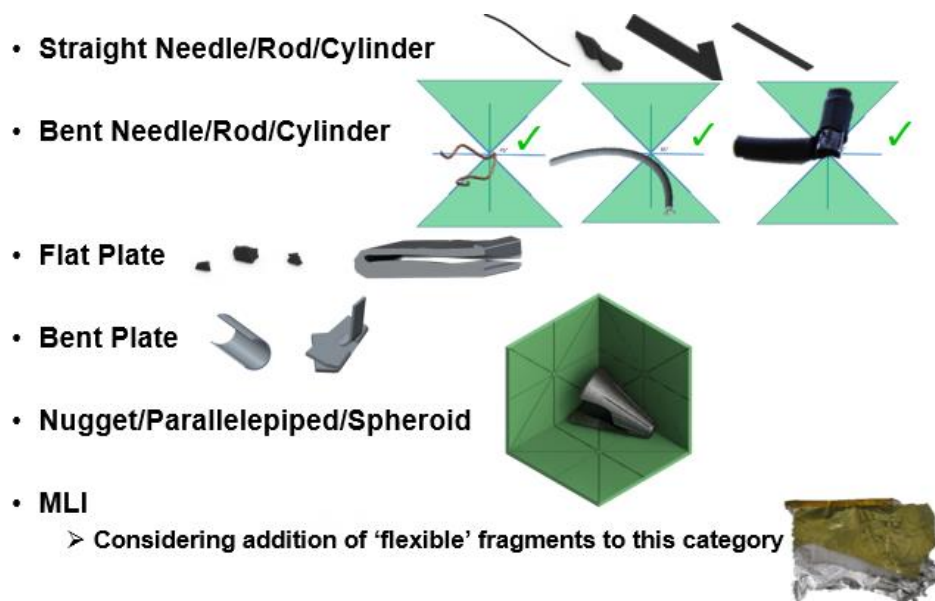


Figure 1 The six DebrisSat shape categories and a few examples of the shapes that fall into each category.

My main duties include problem solving, writing documentation, creating 3D models of example debris, and creating a reference document. A side job I had was to 3D scan and print some example objects to help clarify some thoughts I was working on with my mentor. A major accomplishment so far has been wrapping up the shape characterization document that gives shape constraints and the decision-making reasoning that lead to their approval. This document required significant research and coordination with different interest groups. The purpose of my project was to set up the collection of the right information (correctly) so that future studies can use the information to make better models and post process the data. After my internship I will be the acting DebrisSat shape expert at the University of Florida and will help educate the students working on the project about shape characterization.

My project was more research based so much of what I've learned is problem solving and coordinating with interest groups to make sure all the correct information is captured. It has been exciting to help layout the groundwork for a project without knowing what the correct answer will be. I have learned that by knowing what I don't know can really help me move ahead. These questions can be answered by setting up tasks and problems to be solved and discussed. It has also been a learning process to

understanding exactly what the project requirements are since there are numerous ways to go about a project that might get better results but may not be the right information for current processing abilities.

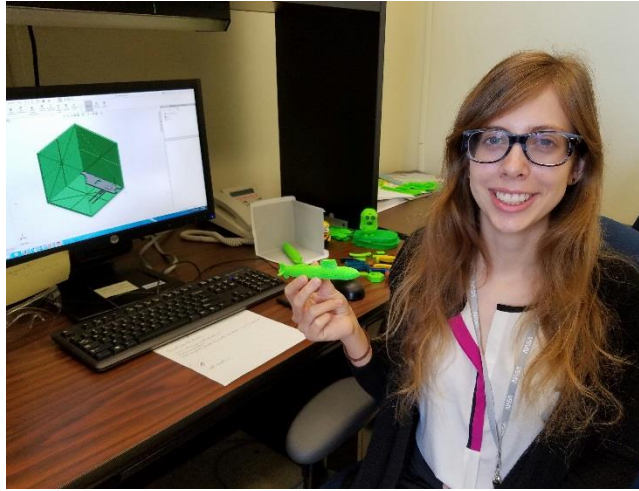


Figure 2 This is my desk and some of the 3D models I designed and printed to gain greater understanding of issues surrounding my project.

This internship has been my first professional and technical internship. It has really helped me gain a greater understanding of the professional workplace and what a career in research is like. I have learned numerous problem solving techniques and technical skills using 3D cad programs ranging from SketchUp to SolidWorks. I have gained greater professional confidence, communications skills, organizational skills, and a love for research! While I've had a hard time deciding on the exact career I'd like to pursue, this internship has helped strengthen my understanding of what I want to do and has helped strengthen my desire to go to graduate school.